

## THE CLAIMS

*The claims of the application, as amended, are:*

1. – 9. (Canceled)

10. (Currently Amended) Power generation apparatus comprising:  
a gas-fueled power generator;  
two-stage reaction apparatus for producing a fuel gas product from a hydrocarbonaceous material, operatively connected to supply fuel gas to said power generator, said reaction apparatus including a pyrolysis chamber comprising a first stage thereof, and a second chamber containing a non-consumable catalyst, comprising a second stage thereof; and means for controlling the flow of fuel gas from said reaction apparatus to said generator, said reaction apparatus being constructed to enable effecting a process comprising the following steps: (a) introducing a non-gaseous hydrocarbonaceous material into said pyrolysis chamber; (b) pyrolyzing the hydrocarbonaceous material in said pyrolysis chamber so as to produce a primary fuel gas mixture, a pyrolysis liquid, and a first carbonaceous residue; (c) introducing the primary fuel gas mixture and the pyrolysis liquid into said second chamber, and heating said liquid therein, in a substantially non-oxidizing atmosphere, to a temperature of 900° to 1100° C and substantially above the temperature at which pyrolysis is effected in step (b), so as to produce additional fuel gases and additional solid carbonaceous residue, without substantially altering the composition of said primary fuel gas mixture; (d) withdrawing the primary fuel gas mixture and the additional fuel gas from said second chamber; and

(e) introducing air, oxygen, carbon dioxide or steam into each of said chambers to effect reaction with, and at least partial removal of, said carbonaceous residue therein; and

electronic data processing means programmed for monitoring the formation of at least one gas phase product and for controlling ~~at least~~ said steps (a) (b) through (e), carried out batchwise as a cycle ~~cycle~~, based upon such gas phase product formation monitoring.

11. (Canceled)

12. (Previously Presented) The power generation apparatus of Claim 10 wherein said at least one gas phase product for which said data processing means is programmed to monitor is selected from the group consisting of hydrogen, methane, carbon monoxide, carbon dioxide, water, and oxygen.

13. (Previously Presented) The power generation apparatus of Claim 10 wherein said data processing means is programmed to monitor the formation of at least three gas phase products for controlling said steps (b) through (e).

14. (Previously Presented) The power generation apparatus of Claim 13 wherein said data processing means is programmed to determine the concentrations of said at least three gas phase products.

15. (Previously Presented) The power generation apparatus of Claim 21 wherein said neural network model is constructed to produce a fuel gas product of selected composition, from a specified hydrocarbonaceous material, by controlling the operating parameters from the first and second stages of said apparatus.

16. (Previously Presented) The power generation apparatus of Claim 14 wherein said at least three gas phase products for which said data processing means is programmed to monitor are selected from the group consisting of hydrogen, methane, carbon monoxide, carbon dioxide, water, and oxygen.

17. (Previously Presented) The power generation apparatus of Claim 10 wherein said non-consumable catalyst in said second chamber is a silica gel-based catalyst.

18. (Previously Presented) The power generation apparatus of Claim 17 wherein said silica gel-based catalyst is in the form of a fixed bed.

19. (Previously Presented) The power generation apparatus of Claim 14 wherein said data processing means is programmed to produce a fuel gas product of selected composition, from a specified hydrocarbonaceous material, by controlling the operating parameters from the first and second stages of said apparatus.

20. (Currently Amended) The power generation apparatus of Claim 19 wherein said apparatus comprises a regenerative life-support system, and wherein said data processing means is programmed to operate said apparatus in a closed-loop mode.

21. (Previously Presented) The power generation apparatus of Claim 14 wherein said data processing means is additionally programmed to implement an artificial neural network model based upon the concentrations of said at least three gas phase products determined.